ZOOLOGY.—*Notes on the undescribed males of two species of Copepoda.* S. KRISHNASWAMY, Madras University. (Communicated by Paul L. Illg.)

In the course of a study of the Copepoda of the Madras coast, males belonging to two species, *Centropages trispinosus* Sewell (1914) and *Diosaccus truncatus* Gurney (1927), known so far only by the females, were discovered. A full description of these male types is given in this paper so as to complete the identification of the species. The types will be lodged in the Indian Museum at Calcutta.

I wish to record my grateful thanks to Dr. C. P. Gnanamuthu, director, Zoology Laboratory, Madras University, for guidance and help and to Lt. Col. R. B. Seymour Sewell, of Cambridge, for going through the paper and offering helpful criticisms.

Centropages trispinosus Sewell

Fig. 1, *a–d*

Centropages trispinosus Sewell, 1914, p. 223, pl. 23, figs. 5–8.

This species was established by Sewell in 1914, on the basis of a solitary female taken at Kilakarai in the Gulf of Manaar, South India, and has not until now been recorded since. While examining the plankton collected in July 1937 from Krusadai Island in the Gulf of Manaar I found several females and males. Large numbers were also found in the inshore plankton collected at Madras in July, August, September, and January.

Sewell (loc. cit.: pl. 18, fig. 7) has given the figure of the second swimming leg and is of opinion that the remaining legs resemble those of *C. alcocki* Sewell. The first swimming leg, however, differs from the second one and has the following structure: The exopodite is nearly twice the length of the endopodite. The first exopod joint carries one outer spine and one inner seta, the second joint one outer spine and one inner seta, and the terminal joint two outer spines, one long, finely serrate apical spine, and four inner setae. The first endopod joint has an inner seta, the second joint two inner setae, and the terminal joint five setae. The outer margins of the exopod as well as the endopod of the swimming feet are hirsute.

The description of the female holotype given by Sewell is fully corroborated by my observations of a large number of females except for the difference stated above.

Male (Fig. 1, *a*).—1.025 mm, smaller than the female.

Body yellowish red with dark red patches on the cephalothorax. A bright-red spot is present on the anal segment. Outline of body with the three spines on posterior corner of cephalothorax as in the female. The abdomen is 4-jointed, whereas in the female it is only 3-jointed.

The right antennule is geniculate and composed of 21 joints, having the following proportional lengths:

1.2.3.4.5.6.7.8.9.10.11.12.13.14.15.16.17.18.19.20.21.
11.9.3.4.6.5.4.5.6. 6. 4. 9.12.16.13.16.15.30.35.15.25.

Seven of these joints (i.e., from the twelfth to the eighteenth) are very swollen. All the joints carry one or two setae each toward the outer side. These setae are short and thick, except those on joints 19, 20, and 21, which are long. The eighteenth joint is hinged to the nineteenth, and these joints each have a toothed plate toward the outer side. The inner distal end of the nineteenth joint has a protuberance, whereas the terminal joint is produced into a fingerlike process. The number of setae and their arrangement are as shown in Fig. 1, *b*. The antenna, mandible, maxillae, and maxilliped are as in the female. The first four pairs of swimming feet as in the female.

The fifth leg of the left side differs from those of the other species of the genus. The exopod is of two joints, the proximal joint has an outer spine, while the distal joint, which is nearly twice as long as the first joint, bears two outer and two apical spines, the outer ones being longer. The endopod is 3-articled and is shorter than the exopod. The first and second joints carry a plumose seta each, while the third has two inner, two outer, and two apical plumose setae (Fig. 1, *c*). The exopod of right fifth leg resembles those of the other members of the genus. The first joint bears a short outer spine, and the "chela" bears two spines one toward the outer side and one toward the inner side, and the outer margin is hirsute. The endopod is 3-jointed, and the first and second joints carry a plumose seta each, the third joint three inner, two apical, and one outer plumose seta (Fig. 1, *d*).

Remarks.—The presence of the spines on the posterior end of the cephalothorax is a distinct

feature that facilitates the identification of this species. The occurrence of this species at Madras is of interest because it was previously known only from Kilakarai, 300 miles south of Madras.

Diosaccus truncatus Gurney

Fig. 2, *a–d*

Diosaccus truncatus Gurney, 1927, p. 513, fig. 136; Sewell, 1940, p. 240.

Gurney described this harpacticoid in 1927 from the females collected by him at Port Said. In the Madras plankton collected on February 21 and 22, 1949, four males and two females were found. A night haul made at Kundugal channel (Gulf of Manaar) on March 22, 1948, yielded four males.

Male.—0.68 mm, distinctly shorter than the female, which measures 0.9 mm.

The rostrum is triangular and mobile. The second, third, and fourth thoracic segments have their lateral margins produced externally into winglike expansion. The abdomen is 4-jointed. The caudal rami are longer than broad, and each ramus carries three spines and an apical jointed seta, which is half as long as the body.

The antennules of the two sides are geniculate. Each antennule is 8-articled, the joints having the following proportional lengths:

1. 2.3–4. 5. 6. 7.8.
11.15. 5. 15.10.10 8.

The line of demarcation between the third and fourth joint is not clear. The fifth joint is very swollen and has a knoblike projection towards its proximal side. It carries an "aesthete" on its distal end. The sixth and seventh joints are hinged and

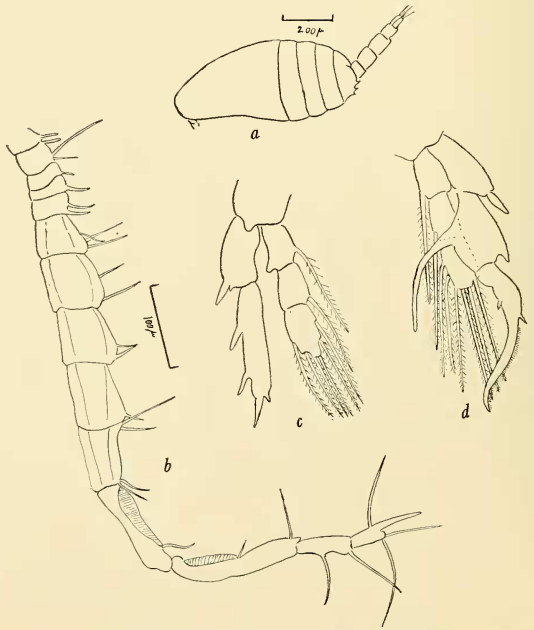

FIG. 1.—*Centropages trispinosus* Sewell: *a*, Lateral view; *b*, right antennule (from the seventh joint); *c*, fifth leg (left side); *d*, fifth leg (right side).

are armed with fine teeth on their inner edges. The arrangement of the setae is as shown in Fig. 2, *b*. The antenna, mouth parts, and the first swimming feet as in the female. The second swimming leg differs from that of the female in the exopod and endopod being of three and two joints and not three and three joints as in the female. Further, the outer margins of the first joints of the exopod and endopod are hirsute. The first and second exopod joints carry a serrate spine each on the outer side, while the third joint has three serrate spines and three setae. The second exopod joint has two inner setae also. The first endopod joint has a seta toward the inner side, while the terminal joints carries two spines and two setea, two of which are modified (Fig. 2, *c*). The third and fourth swimming legs as in the female. Fifth leg has the basal expansion completely fused and bears two unequal spines and three setae (Fig. 2, *d*: L_5). Sixth leg is rudimentary and is represented by a stout spine and two setae (Fig. 2, *d*: L_6).

Remarks.—The female of this species found at Madras is smaller in size compared with the form described by Gurney from Port Said. It is being recorded for the first time from the Bay of Bengal.

REFERENCES

Gurney, R. *Report on Crustacea Copepoda.* Trans. Zool. Soc. London **22:** 451. 1927.

Nicholls, A. G. *A revision of the families Diosaccidae Sars and Laophontidae T. Scott.* Rec. South Australian Mus. **7:** 165. 1941.

Sewell, R. B. S. *Notes on surface copepods of the Gulf of Mannar.* Spolia Zeylanica **9:** 191. 1914.

———. *Copepods of the Indian seas: Calanoida.* Mem. Indian Mus. **10** (2). 1932.

———. *Copepoda Harpacticoida.* John Murray Expedition Sci. Rep. **7** (2). 1940.

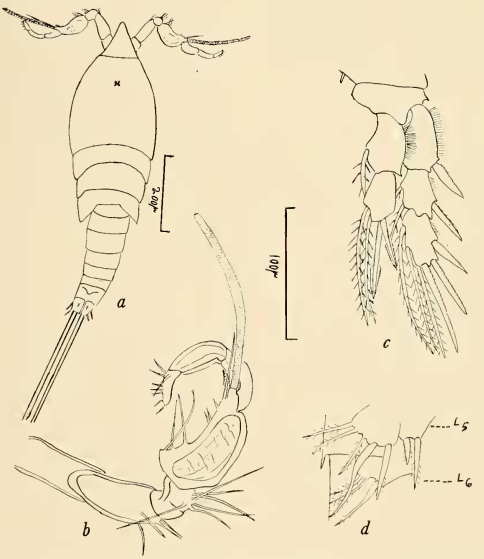

Fig. 2.—*Diosaccus truncatus* Gurney: *a*, Dorsal view; *b*, antennule; *c*, second swimming feet; *d*, fifth leg (L_5), sixth leg (L_6).